# Drainage Design Report

for **New Fire Station at Manorhamilton, Co Leitrim**

On behalf of **Leitrim County Council**

Prepared by:

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**May 2023**

Civil
Structural
Traffic

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**Appendices:**



Report By: Stuart Summerfield

Date 11th May 2023

## Document Control

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Revision History:** | R0 | | | | | | | |
| **Purpose of Issue:** C = Comment I = Information FC = Fire Cert PL = Planning T = Tender CN = Construction CT = Contract | I | | | | | | | |
| **Date:** | 11 05 23 | | | | | | | |
| **Originator:** | SS | | | | | | | |
| **Checked By:** | SS | | | | | | | |
| **Approved By:** | SS | | | | | | | |

# 1. Introduction

CST Group Chartered Consulting Engineers was appointed by Leitrim County Council to provide a storm water drainage design for a proposed new fire station at Manorhamilton, Co Leitrim, to include design for a piped system in line with SuDS best practice.

# 2. Surface Water Management

## 2.1 Existing Surface Water Drainage Regime

2.1.1 The site comprises undeveloped, greenfield land which slopes generally from north-east to south-west. There does not appear to be any existing storm drainage provision on the lands. There is an existing open drain to the south-west of the lands, alongside the N16 National Road. It is likely the surface water run-off from the entire land holdings discharges to this open drain. This open drain likely discharges to the river/steam that is located approximately 100m south-west of the development lands.

## 2.2 Surface Water Drainage Discharge Options

2.2.1 The following options have been considered for storm water drainage of these lands.

**Option 1 – Infiltrate to Groundwater**

Infiltration tests have not been undertaken on the site however intrusive site investigation found the ground to generally comprise of silty clay. Local knowledge suggests the use of soak-aways on this site are not viable.

**Option 2 – Discharge into the Existing Storm Water Drain Alongside the N16**

The open drain to the south-west of the lands is approximately 400mm in depth and varies in width. The development lands generally fall from the north-east to the south-west in the direction of this open drain. It is probable the lands already drain to this ditch. In order to ensure downstream flooding does not result from the increased run-off rate from this development, any discharge to this ditch should be controlled to pre-development run-off rates.

**Option 3 – Discharge to the river approximately 100m south-west of the development Lands**

There is an existing stream/river approximately 100m to the south-west of the proposed development lands. This river is a tributary of the Bonnet River approximately 500m to the west. As the open drain outlined in Option 2 above connects with this tributary, installation of a new pipe from the development to this stream is considered an unsustainable use of materials.

2.2.2 In view of the assessment of these options it was decided, in order to best replicate the existing drainage path and the goals of SuDS best management practises, to discharge the storm water run-off to the existing open drain to the south-west, adjacent to the N16 National Road. In order to replicate existing run-off rates on site attenuation should be provided together with a restrictor on the drainage train prior to the outfall to ensure run-off is controlled to pre-development run-off rates.

2.2.3 The drainage attenuation system should be sized sufficient to accommodate all storm durations and intensities up to the 1:30 year storm without surface water leaving the site.

2.2.4 The green field predevelopment run-off from the lands should be no greater that outlined in the Flood Studies Report. Details of run-off from the lands are shown in **Appendix A.** The post development run-off should be no greater than this figure.

## 2.3 Surface Water Drainage Strategy

2.3.1 A surface water drainage strategy has been prepared in accordance with the general design principles set out below and in general compliance with TII standard DN-DNG-03066 'Design of Earthworks, Drainage, Network Drainage, Attenuation & Pollution Control' and also the Irish Water document 'Code of Practice for Wastewater Infrastructure'. The strategy has been prepared based on the catchment areas/boundaries as defined by existing site topography.

2.3.2 The strategy comprises a conventional, gravity piped drainage system that will collect and convey surface water run-off arising from the catchment. The design levels and drainage layout are such that the designed system will discharge via gravity to the outfall location.

2.3.3 Due to the requirement to control the outflow of water from the site to no greater than pre-development levels, the storm network will discharge via an open lagoon in advance of the discharge point. The discharge will be controlled by a Hydro-brake to limit flows equivalent green field run-off.

2.3.4 The lagoon will be sized to accommodate surface water run-off arising from the development for up to and including the 1-in-30 year rainfall event, plus an allowance for climate change (20%). Exceptional events in excess of the 1:30 year storm may overtop the discharge control (Hydrobrake) and result in short term uncontrolled flows into the adjacent open drain.

## 2.4 Design Parameters

This section sets out the design parameters that have been used in the design of the surface water drainage pipe network and surface water balancing measures serving the proposed development.

2.4.1 <u>Limiting/Allowable Discharge Rate</u>

The greenfield run-off rates from the lands to be developed have been calculated utilising the Institute of Hydrology Report 124 (IoH124) 'Flood Estimation for Small Catchments (1994)'

methodology and catchment specific rainfall parameters derived from the Flood Estimation Handbook (FEH) – see **Appendix A** for Greenfield Run-off Rate Estimation. In order to determine run-off rates the permeability of the soil should first be determined. The flood studies report (NERC 1975) divides soil types into 5 categories:

- SOIL Type 1 = SPR 0.1 (sandy highly permeable material);
- SOIL Type 2 = SPR 0.3;
- SOIL Type 3 = SPR 0.37;
- SOIL Type 4 = SPR 0.47
- SOIL Type 5 = SPR 0.53

The default soil type for the site, as used by the HR Wallingford software which is derived from the Irish SuDS map, is Type 5. Site investigation was undertaken on the site. It was found there is a thin layer of topsoil varying from 100mm to 150mm over generally silty clay.

Calculations are provided in **Appendix B**.

| Return Period | Greenfield Run-off Rate l/sec/Ha | Greenfield Run-off Rate – Network 1 Catchment Area 0.277Ha (l/s) |
|---|---|---|
| $Q_{bar}$ | 14.15 | 3.92 |
| $Q_{30}$ | 23.32 | 6.46 |
| $Q_{100}$ | 83.96 | 7.63 |

Table 1. Greenfield Run-off for Subject Land SOIL Type 5

The surface water drainage strategy for developments generally assume that surface water outflows are limited to the mean annual run-off rate ($Q_{bar}$) for all storm events up to and including the 1:30-year return period.

Discharge to the open drain will be controlled by way of a Hydrobake adjacent to the attenuation lagoon. Surplus flow will back-up in the lagoon for temporary storage.

2.4.2 Volumetric Run-off Coefficient for Design of the Attenuation Provision

An onerous volumetric runoff coefficient (Cv) of 0.85 has been utilized in the sizing of the surface water pipes and simulated for the 1:30 year storm using a Cv of 1.0.

2.4.3 Impermeable Areas

The proposed impermeable areas associated with the development proposals have been taken from the site layout plan for the development. It has been assumed that 100% of the paved development will be impermeable and the run-off from this area will be routed via an underground pipe network to the outfall. The total areas contributing to the storm drainage network comprise impermeable areas such as roads, buildings and hard standing.

2.4.4 Piped Surface Water Drainage System

The proposed surface water drainage system will comprise a network of pipes which will be designed and constructed in accordance with the requirements of the Department of the Environment and Local Government's 'Recommendations for Site Development Works for Housing Areas' and/or the 'Specification for Road Works' and also subject to the approval of Leitrim County Council.

2.4.5 The Modified Rational Method has been used for the design of the drainage network by use of the 'MicroDrainage' software. Calculations for the surface water drainage catchment are included in **Appendix B**. These set out catchment and impermeable areas. The calculations also outline the maximum and minimum pipe velocities.

2.4.6 Calculations for the pipe flows and discharge rates are shown in **Appendix B** for the development. Analysis found the critical storm for the lands occurs during the 580-minute duration storm. This event has been assessed for the 1:30 year return period storm.

2.4.7 Details of the general arrangement/configuration of the surface water drainage infrastructure is shown on drawing number 119247-500 in **Appendix C**.

## 2.5 Contaminates

2.5.1 Hydrocarbons

Removal of hydrocarbons from the surface water drainage network will be achieved by use of trapped road gullies on the road network and a by-pass interceptor placed in advance of the outfall. The proposed interceptor is a Kingspan NSBE025. This has been sized to accommodate surface water flows from all hard paved areas. Details of the interceptor are provided in **Appendix D**. Regular cleaning of the gullies and interceptor should be undertaken to ensure capacity is maintained for hydrocarbons and other detritus.

## 2.6 N16 Drainage

2.6.1 Piping of Existing Open Drain

The N16 to the north-east of the development appears to discharge surface water to an existing 225mm diameter storm water sewer located within the northern verge of the N16. This 225mm diameter sewer discharges to the open drain that exists to the front of the proposed development lands. In order to construct the entrance to the operations yard it is proposed to pipe a section of this existing open drain.

It is proposed to install 375mm diameter pipe on the line of the open drain. This pipe will have capacity to convey flows from the existing 225mm diameter sewer and also the controlled discharge flows from the development site.

# 3. Foul Water Management

## 3.1 Existing Foul Water Drainage Regime

The existing site is a greenfield site and there is no existing foul water infrastructure on the site.

## 3.2 Foul Water Drainage Discharge

An existing foul water treatment plant is located to the north-west of the development lands. As the treatment plant levels are higher than the proposed development it is proposed to provide an on-site package pumping station to pump foul water directly to this treatment plant.

### 3.2.1 Piped Foul Water Drainage System

The proposed foul water drainage system will comprise a network of pipes which will be designed and constructed in accordance with the requirements of the Irish Water document *Code of Practice for Wastewater Infrastructure.*

The proposed network is shown on drawing number 119247-502 in **Appendix E**.

# 4. Conclusions

## 4.1 Existing Undeveloped Lands

4.1.1 The existing lands are undeveloped green field lands. There is no existing underground storm network crossing the lands. There is an existing open drain to the south-west boundary of the lands.

4.1.2 Ground investigation found the underlying soils to be silty clay. The FSR identifies the lands to be SOIL Type 5.

4.1.3 There is no existing foul drainage crossing the lands. There is an existing foul water treatment plant located to the north-east of the lands.

## 4.2 Post Development

4.2.1 To provide an impact-neutral drainage strategy for the storm water from this development the surface water run-off will be routed to the existing open drain to the south-west. Surface water run-off from the lands will be controlled to rates equivalent green-field run-off rates.

4.2.2 All storms up to and including the 1:30 year storm will be attenuated.

4.2.3 Foul effluent from the development will be routed to the existing foul water treatment plant to the north-east.

# APPENDIX A

# Greenfield Run-off Rate Estimation

# Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

| | |
|---|---|
| Calculated by: | Stuart summerfield |
| Site name: | 119247 Fire Stn |
| Site location: | Manorhamilton |

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

**Site Details**

| | |
|---|---|
| Latitude: | 54.30207° N |
| Longitude: | 8.18691° W |
| Reference: | 3453762674 |
| Date: | Aug 09 2021 16:31 |

## Runoff estimation approach

IH124

## Site characteristics

Total site area (ha): .277

## Methodology

| | |
|---|---|
| $Q_{BAR}$ estimation method: | Calculate from SPR and SAAR |
| SPR estimation method: | Calculate from SOIL type |

## Soil characteristics

| | Default | Edited |
|---|---|---|
| SOIL type: | 5 | 5 |
| HOST class: | N/A | N/A |
| SPR/SPRHOST: | 0.53 | 0.53 |

## Hydrological characteristics

| | Default | Edited |
|---|---|---|
| SAAR (mm): | 1403 | 1403 |
| Hydrological region: | 13 | 13 |
| Growth curve factor 1 year: | 0.85 | 0.85 |
| Growth curve factor 30 years: | 1.65 | 1.65 |
| Growth curve factor 100 years: | 1.95 | 1.95 |
| Growth curve factor 200 years: | 2.15 | 2.15 |

## Notes

### (1) Is $Q_{BAR}$ < 2.0 l/s/ha?

When $Q_{BAR}$ is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

### (2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

### (3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

## Greenfield runoff rates

| | Default | Edited |
|---|---|---|
| $Q_{BAR}$ (l/s): | 3.92 | 3.92 |
| 1 in 1 year (l/s): | 3.33 | 3.33 |
| 1 in 30 years (l/s): | 6.46 | 6.46 |
| 1 in 100 year (l/s): | 7.63 | 7.63 |
| 1 in 200 years (l/s): | 8.42 | 8.42 |

# APPENDIX B

# Network Analysis – Storm Network

## STORM SEWER DESIGN by the Modified Rational Method

### Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

| | | | |
|---|---|---|---|
| Return Period (years) | 2 | Add Flow / Climate Change (%) | 20 |
| M5-60 (mm) | 18.000 | Minimum Backdrop Height (m) | 0.200 |
| Ratio R | 0.200 | Maximum Backdrop Height (m) | 1.500 |
| Maximum Rainfall (mm/hr) | 50 | Min Design Depth for Optimisation (m) | 1.200 |
| Foul Sewage (l/s/ha) | 0.00 | Min Vel for Auto Design only (m/s) | 1.00 |
| Volumetric Runoff Coeff. | 0.850 | Min Slope for Optimisation (1:X) | 500 |

Designed with Level Soffits

### Network Design Table for Storm

| PN | Length (m) | Fall (m) | Slope (1:X) | Area (ha) | T.E. (mins) | DWF (l/s) | k (mm) | HYD SECT | DIA (mm) |
|---|---|---|---|---|---|---|---|---|---|
| 1.000 | 23.800 | 0.119 | 200.0 | 0.071 | 5.00 | 0.0 | 0.600 | o | 225 |
| 1.001 | 19.200 | 0.096 | 200.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 225 |
| 2.000 | 24.000 | 0.120 | 200.0 | 0.041 | 5.00 | 0.0 | 0.600 | o | 225 |
| 1.002 | 20.800 | 0.197 | 105.6 | 0.020 | 0.00 | 0.0 | 0.600 | o | 225 |
| 3.000 | 22.300 | 0.112 | 199.1 | 0.145 | 5.00 | 0.0 | 0.600 | o | 225 |
| 1.003 | 17.000 | 0.085 | 200.0 | 0.000 | 0.00 | 0.0 | 0.600 | o | 300 |

### Network Results Table

| PN | Rain (mm/hr) | T.C. (mins) | US/IL (m) | Σ Area (ha) | Σ DWF (l/s) | Foul (l/s) | Add Flow (l/s) | Vel (m/s) | Cap (l/s) | Flow (l/s) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.000 | 44.70 | 5.43 | 40.900 | 0.071 | 0.0 | 0.0 | 1.9 | 0.92 | 36.6 | 11.7 |
| 1.001 | 43.77 | 5.78 | 40.781 | 0.071 | 0.0 | 0.0 | 1.9 | 0.92 | 36.6 | 11.7 |
| 2.000 | 44.69 | 5.43 | 40.900 | 0.041 | 0.0 | 0.0 | 1.1 | 0.92 | 36.6 | 6.7 |
| 1.002 | 43.08 | 6.05 | 40.685 | 0.132 | 0.0 | 0.0 | 3.5 | 1.27 | 50.6 | 20.9 |
| 3.000 | 44.78 | 5.40 | 40.600 | 0.145 | 0.0 | 0.0 | 4.0 | 0.92 | 36.7 | 23.9 |
| 1.003 | 42.46 | 6.31 | 40.413 | 0.277 | 0.0 | 0.0 | 7.2 | 1.11 | 78.3 | 43.3 |

## Manhole Schedules for Storm

| MH Name | MH CL (m) | MH Depth (m) | MH Diam.,L*W (mm) | PN | Pipe Out Invert Level (m) | Diameter (mm) | PN | Pipes In Invert Level (m) | Diameter (mm) | Backdrop (mm) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 42.170 | 1.270 | 1050 | 1.000 | 40.900 | 225 | | | | |
| 2 | 42.170 | 1.389 | 1050 | 1.001 | 40.781 | 225 | 1.000 | 40.781 | 225 | |
| 3 | 42.170 | 1.270 | 1050 | 2.000 | 40.900 | 225 | | | | |
| 4 | 42.170 | 1.485 | 1050 | 1.002 | 40.685 | 225 | 1.001 | 40.685 | 225 | |
| | | | | | | | 2.000 | 40.780 | 225 | 95 |
| 5 | 41.300 | 0.700 | 1050 | 3.000 | 40.600 | 225 | | | | |
| 5 | 41.300 | 0.887 | 1050 | 1.003 | 40.413 | 300 | 1.002 | 40.488 | 225 | |
| | | | | | | | 3.000 | 40.488 | 225 | |
| | 41.100 | 0.772 | 0 | | OUTFALL | | 1.003 | 40.328 | 300 | |

## Free Flowing Outfall Details for Storm

| Outfall Pipe Number | Outfall Name | C. Level (m) | I. Level (m) | Min I. Level (m) | D,L (mm) | W (mm) |
|---|---|---|---|---|---|---|
| 1.003 | | 41.100 | 40.328 | 0.000 | 0 | 0 |

## Simulation Criteria for Storm

| | | | |
|---|---|---|---|
| Volumetric Runoff Coeff | 0.850 | Foul Sewage per hectare (l/s) | 0.000 |
| PIMP (% impervious) | 100 | Additional Flow - % of Total Flow | 20.000 |
| Areal Reduction Factor | 1.000 | MADD Factor * 10m³/ha Storage | 2.000 |
| Hot Start (mins) | 0 | Run Time (mins) | 1160 |
| Hot Start Level (mm) | 0 | Output Interval (mins) | 10 |
| Manhole Headloss Coeff (Global) | 0.500 | | |

| | | | |
|---|---|---|---|
| Number of Input Hydrographs | 0 | Number of Storage Structures | 1 |
| Number of Online Controls | 1 | Number of Time/Area Diagrams | 0 |
| Number of Offline Controls | 0 | | |

## Synthetic Rainfall Details

| | | | |
|---|---|---|---|
| Rainfall Model | FSR | Profile Type | Summer |
| Return Period (years) | 30 | Cv (Summer) | 0.850 |
| Region | Scotland and Ireland | Cv (Winter) | 0.840 |
| M5-60 (mm) | 18.000 | Storm Duration (mins) | 580 |
| Ratio R | 0.200 | | |

## Online Controls for Storm

### Hydro-Brake® Manhole: 5, DS/PN: 1.003, Volume (m³): 2.4

Design Head (m) 0.500 Hydro-Brake® Type Md11 Invert Level (m) 40.413
Design Flow (l/s) 3.9 Diameter (mm) 98

| Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) | Depth (m) | Flow (l/s) |
|---|---|---|---|---|---|---|---|
| 0.100 | 1.6 | 1.200 | 6.1 | 3.000 | 9.6 | 7.000 | 14.7 |
| 0.200 | 2.5 | 1.400 | 6.6 | 3.500 | 10.4 | 7.500 | 15.2 |
| 0.300 | 3.1 | 1.600 | 7.0 | 4.000 | 11.1 | 8.000 | 15.7 |
| 0.400 | 3.5 | 1.800 | 7.4 | 4.500 | 11.8 | 8.500 | 16.2 |
| 0.500 | 4.0 | 2.000 | 7.8 | 5.000 | 12.4 | 9.000 | 16.6 |
| 0.600 | 4.3 | 2.200 | 8.2 | 5.500 | 13.0 | 9.500 | 17.1 |
| 0.800 | 5.0 | 2.400 | 8.6 | 6.000 | 13.6 | | |
| 1.000 | 5.6 | 2.600 | 8.9 | 6.500 | 14.1 | | |

## Storage Structures for Storm

### Tank or Pond Manhole: 5, DS/PN: 1.003

Invert Level (m) 40.413

| Depth (m) | Area (m²) | Depth (m) | Area (m²) |
|---|---|---|---|
| 0.000 | 63.6 | 0.500 | 175.1 |

## Summary of Results for 580 minute 30 year Summer (Storm)

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF
Analysis Timestep Fine Inertia Status OFF
DTS Status ON

| PN | US/MH Name | Water Level (m) | Surcharged Depth (m) | Flooded Volume ($m^3$) | Flow / Cap. | Overflow (l/s) | Pipe Flow (l/s) | Status |
|---|---|---|---|---|---|---|---|---|
| 1.000 | 1 | 41.119 | -0.006 | 0.000 | 0.16 | 0.0 | 5.3 | OK |
| 1.001 | 2 | 41.116 | 0.110 | 0.000 | 0.15 | 0.0 | 4.9 | SURCHARGED |
| 2.000 | 3 | 41.115 | -0.010 | 0.000 | 0.09 | 0.0 | 3.0 | OK |
| 1.002 | 4 | 41.113 | 0.203 | 0.000 | 0.19 | 0.0 | 8.7 | SURCHARGED |
| 3.000 | 5 | 41.114 | 0.289 | 0.000 | 0.31 | 0.0 | 10.3 | FLOOD RISK |
| 1.003 | 5 | 41.108 | 0.395 | 0.000 | 0.07 | 0.0 | 4.6 | FLOOD RISK |

# APPENDIX C

# Storm Drainage Network Drawing

N

Access Unit
Gully Unit
Kerb drainage Beany block
PUMPING STATION ENCLOSURE
CARWASH
DRILL TOWER
STORE
150Ø SWS
ACO Multidrain VHD Duct Channel
Pump
S1
PN 1.000 225Ø SWS
S2
S3
PN 1.001 225Ø SWS
PN 2.000 225Ø SWS
S4
ACO Drain
PN 1.002 225Ø SWS
Existing open drain to be raise with 375Ø PCC pipe
Overflow pipe from underground tank connected to open attenuation lagoon
A-A
Slope 1:3 to lagoon
Slope 1:5 to lagoon
B-B
Open attenuation lagoon
Base area 63.2m²
Top area 175m²
Depth 0.5m IL 40.413
Side slopes 1:5
S5
Hydrobrake limiting flow to 3.9 l/s
P.C.C Headwall
Petrol interceptor Kingspan NSBE 025
PN 1.003 225Ø SWS
Discharge to existing open drain
Headwall
Silt Sock during construction phase
Stn 1000 43.59
Stn 1001 43.09
N16

**KEY**

- Landscaped area
- Attenuation lagoon
- 225Ø SWS pipe
- ACO Drain
- Kerb drainage Beany Block

| REV. | AMENDMENT | BY | DATE |
|---|---|---|---|
| P7 | Minor amendments | KL | 22.03.23 |
| P6 | Layout updated | KL | 20.03.23 |
| P5 | Drill tower added and storm discharge | KL | 06.10.22 |
| P4 | Building layout amended | KL | 14.01.22 |
| P3 | Building layout amended & Slit Sock added | KL | 10.12.21 |
| P2 | 2A report amendments | KL | 15.09.21 |
| P1 | Minor amendments | KL | 06.09.21 |

| | | | |
|---|---|---|---|
| DRAWN: | KL | TECH. CHECK: | ST |
| SCALE @ A1: | 1:250 | ENG. CHECK: | C.O'C |
| DATE: | 10.08.2021 | APPROVED: | C.O'C |
| STAGE: | PLANNING | | |

JOB TITLE: NEW FIRE STATION AT MANORHAMILTON, Co LEITRIM

DRAWING TITLE: STORM WATER DRAINAGE

CLIENT: LEITRIM CO CO

DRAWING No: 119-247-500 REV: P7

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# APPENDIX D

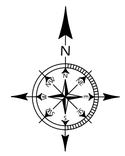
# By-Pass Interceptor

Bypass separators fully treat all flows generated by rainfall rates of up to 6.5mm/hr. This covers over 99% of all rainfall events. Flows above this rate are allowed to bypass the separator. These separators are used when it is considered an acceptable risk not to provide full treatment for high flows, for example where the risk of a large spillage and heavy rainfall occurring at the same time is small.

| Product code | Flow (l/s) | Peak Flow Rate (l/s) | Drainage area (m 2) | Storage Capacity (Ltrs) | Storage Capacity (Ltrs) | Length (mm) | Diameter (mm) | Access Shaft Diameter (mm) | Base Inlet Invert (mm) | Base to Outlet Invert (mm) | Standard Fall Across (mm) | Min Inlet Invert (mm) | Stan Pipe Dian (m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| - | - | - | - | Silt | Oil | - | - | - | - | - | - | - | - |
| NSBP003 | 3 | 30 | 1670 | 300 | 45 | 1700 | 1350 | 600 | 1420 | 1320 | 100 | 500 | 16 |
| NSBP004 | 4.5 | 45 | 2500 | 450 | 60 | 1700 | 1350 | 600 | 1420 | 1320 | 100 | 500 | 16 |
| NSBP006 | 6 | 60 | 3335 | 600 | 90 | 1700 | 1350 | 600 | 1420 | 1320 | 100 | 500 | 16 |
| NSBE010 | 10 | 100 | 5560 | 1000 | 150 | 2069 | 1220 | 750 | 1450 | 1350 | 100 | 700 | 3 |
| NSBE015 | 15 | 150 | 8335 | 1500 | 225 | 2947 | 1220 | 750 | 1450 | 1350 | 100 | 700 | 3 |
| NSBE020 | 20 | 200 | 11111 | 2000 | 300 | 3893 | 1220 | 750 | 1450 | 1350 | 100 | 700 | 3 |
| NSBE025 | 25 | 250 | 13890 | 2500 | 375 | 3575 | 1420 | 750 | 1680 | 1580 | 100 | 700 | 3 |
| NSBE030 | 30 | 300 | 16670 | 3000 | 450 | 4265 | 1420 | 750 | 1680 | 1580 | 100 | 700 | 4 |
| NSBE040 | 40 | 400 | 22222 | 4000 | 600 | 3230 | 1920 | 600 | 2185 | 2035 | 150 | 1000 | 5 |
| NSBE050 | 50 | 500 | 27778 | 5000 | 750 | 3960 | 1920 | 600 | 2185 | 2035 | 150 | 1000 | 6 |
| NSBE075 | 75 | 750 | 41667 | 7500 | 1125 | 5841 | 1920 | 600 | 2235 | 2035 | 200 | 950 | 6 |
| NSBE100 | 100 | 1000 | 55556 | 10000 | 1500 | 7661 | 1920 | 600 | 2235 | 2035 | 200 | 950 | 7 |

# APPENDIX E

# Foul Drainage Network Drawing




63mm HDPE
Rising main discharge directly into treatment plant at IL: 44.80m

Min cover to rising main 1.2m in roadways 900mm in soft areas

Stn 1000
43.59

Stn 1001
43.09

Kingspan BPSB27 package pump stn

63mm HDPE rising main

Control Kiosk

PUMPING STATION ENCLOSURE

Car wash grit sump W1 040 Klargester

CARWASH

Washdown interceptor Kingspan NSFP 003 interceptor

150mm Ø FWS min cover 1.2m

FW01
CL: 42.17m
IL: 40.82m

DRILL TOWER

STORE

FLAT ROOF

UNDERGROUND WATER TANK

LAGOON

N16

N16

**KEY**

- 150Ø Foul water pipe
- Wash bay concrete pad
- Pumping station
- Kingspan Interceptor NSFP 003
- Klargester Grit sump W1 040

| REV. | AMENDMENT | BY | DATE |
|---|---|---|---|
| P8 | Minor amendments | KL | 22.03.23 |
| P7 | Updated layout | KL | 20.03.23 |
| P6 | Drill tower added | KL | 06.10.22 |
| P5 | Building layout amended | KL | 11.02.22 |
| P4 | Building layout amended | KL | 14.01.22 |
| P3 | Building layout amended | KL | 13.12.21 |
| P2 | 2A report amendments | KL | 15.09.21 |
| P1 | Minor amendments | KL | 06.09.21 |

| | | | |
|---|---|---|---|
| DRAWN: | KL | TECH. CHECK: | ST |
| SCALE @ A1: | 1:250 | ENG. CHECK: | C.O'C |
| DATE: | 30.08.2021 | APPROVED: | C.O'C |
| STAGE: | PLANNING | | |

JOB TITLE: NEW FIRE STATION AT MANORHAMILTON, Co LEITRIM

DRAWING TITLE: FOUL DRAINAGE LAYOUT

CLIENT: LEITRIM CO CO

DRAWING No: 119-247-502 REV: P8

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